

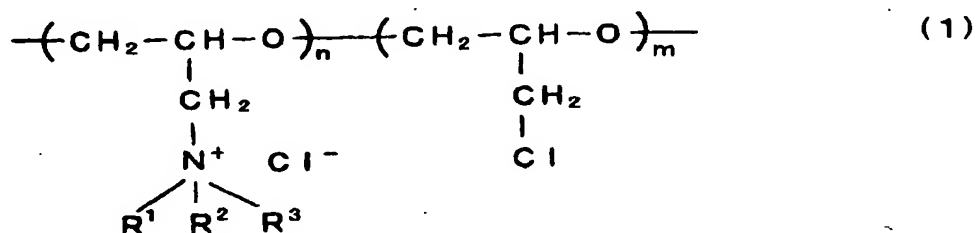
## CLAIMS

1. A copper electrolytic solution containing as additives:

(A) at least one quaternary amine salt selected from the group consisting of (a) quaternary amine salts obtained by reaction between epichlorohydrin and an amine compound mixture composed of a secondary amine compound and a tertiary amine compound, and (b) polyepichlorohydrin quaternary amine salts; and

(B) an organic sulfur compound.

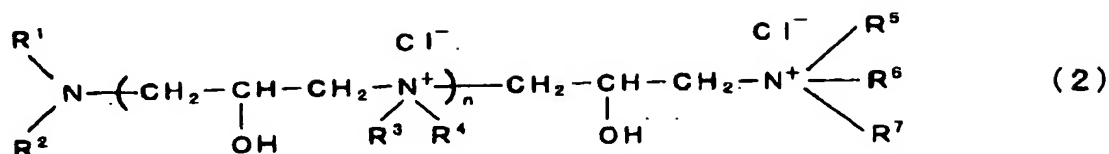
2. The copper electrolytic solution according to Claim 1, wherein the polyepichlorohydrin quaternary amine salt is composed of repeating units expressed by the following General Formula (1):



(in General Formula (1),  $\text{R}^1$ ,  $\text{R}^2$ , and  $\text{R}^3$  are each a methyl group or ethyl group,  $n$  is a number greater than zero,  $m$  is a number greater than zero,  $n + m = 10$  to  $1000$ , and  $n/(n + m) \geq 0.65$ ).

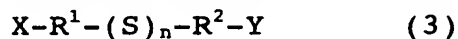
3. The copper electrolytic solution according to Claim 1, wherein the quaternary amine salt obtained by reaction between epichlorohydrin and an amine compound mixture composed of a secondary amine compound and a

tertiary amine compound is expressed by the following General Formula (2):

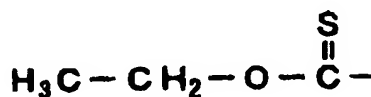
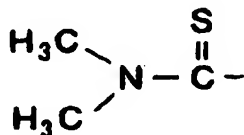
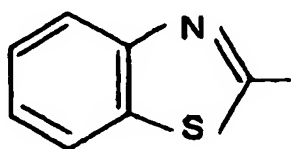


(in General Formula (2),  $\text{R}^1$ ,  $\text{R}^2$ ,  $\text{R}^3$ ,  $\text{R}^4$ ,  $\text{R}^5$ ,  $\text{R}^6$ , and  $\text{R}^7$  are each a methyl group or ethyl group, and  $n$  is a number from 1 to 1000).

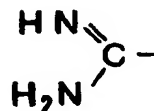
4. The copper electrolytic solution according to Claim 1, wherein the organic sulfur compound is expressed by the following General Formula (3) or (4):



(in General Formulas (3) and (4),  $\text{R}^1$ ,  $\text{R}^2$ , and  $\text{R}^3$  are each an alkylene group with 1 to 8 carbon atoms,  $\text{R}^4$  is selected from the group consisting of hydrogen,



and



$\text{X}$  is selected from the group consisting of hydrogen, a sulfonic acid group, a phosphonic acid group, and an alkali metal salt or ammonium base of sulfonic acid or phosphonic

acid, Y is selected from the group consisting of a sulfonic acid group, a phosphonic acid group, and an alkali metal salt of sulfonic acid or phosphonic acid, Z is hydrogen or an alkali metal, and n is 2 or 3).

5. An electrolytic copper foil produced using the copper electrolytic solution according to any of Claims 1 to 4.

6. A copper-clad laminated board produced using the electrolytic copper foil according to Claim 5.